

IN THE DRAWINGS

Fig. 1 of the drawings has been amended to include the caption "PRIOR ART" as indicated in the accompanying ANNOTATED SHEET SHOWING CHANGES. This change is incorporated in the accompanying REPLACEMENT SHEET.

The claims have been amended to more clearly define the invention as disclosed in the written description. In particular, claim 8 has been amended for clarity.

The Examiner has rejected claims 1-4 and 8 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,487,535 to Smyth et al. and U.S. Patent 6,246,345 to Davidson et al.

The Smyth et al. patent discloses a multi-channel audio encoder in which a plurality of input channels (e.g., CH 1 - CH 5) are applied to respective channel encoders 26 "that produce respective sets of encoded subband signals 28, suitably 32 subband signals per channel." (col. 6, lines 61-63) As described at col. 7, lines 39-43, "a multiplexer 32 multiplexes the subband signals and side information into the data stream 16 in accordance with a specified data format." Further, at col. 31, lines 39-41, Smyth et al. states that the multiplexer 32 "packs the data for each channel and then multiplexes the packed data for each channel into an output frame to form the data stream 16." In describing the decoder, Smyth et al. states, at col. 40, lines 16, "After synchronization, the unpacker 40 unpacks the compressed audio data

stream 16, detects and if necessary corrects transmission induced errors, and demultiplexes the data into individual audio channels. The subband differential signals are requantized into PCM signals and each audio channel is inverse filtered to convert the signal back into the time domain. It should be apparent that Smyth et al. is intent on providing reconstructed signals on output channels corresponding to the input audio signals on the input channels of the encoder.

The Davidson et al. patent discloses using gain-adaptive quantization and non-uniform symbol lengths for improved audio coding, in which a synthesis filterbank 39 is shown in Fig. 2.

The subject invention concerns the processing of multi-channel audio signals to form reproduction (output) channels which may not correspond in number to the number of input audio channels. As indicated in claim 1, each of the input channels of the multi-channel audio signal is supplied through separate sub-channels covering distinct frequency sub-band domains. However, as claimed in claim 1, the device of the subject invention includes "sub-band combination circuits, each being supplied (from the signal supply means) with audio signals through respective input channels which lie in one and the same sub-band frequency domain..." This is clearly shown in, for example, Fig. 2, in which the first sub-band of each input channel is applied to SBS1 (sub-band combination circuit 1), the second sub-band of each input channel is applied to SBS2, ...,

etc. The output signals from these sub-band combination circuits SBS1-SBSn are applied to respective synthesis or reconstruction filters for forming each output channel.

Applicants submit that the combination of Smyth et al. and Davidson et al. does not disclose the sub-band combination circuits as claimed in claim 1.

The Examiner states "The sub-band combination circuits are inherently disclosed as evidence by the fact that the subband are recombined in the decoder to produce a signal PCM audio signal (col. 8, lines 24-34, 63 - col. 9, lines 1-4)."

Applicants submit that while some form of sub-band combination circuit may arguably be inherent in Smyth et al., the sub-band combination circuits connected as claimed in claim 1 are not inherent in Smyth et al. In particular, the intent of Smyth et al. is to reconstruct at outputs 22, the signals having been applied to the inputs 14 in Fig. 1. To that extent, the "inherent" combination circuits combine the subbands of each channel to form the channel signals CH1, CH2, However, the intent of the subject invention is not to reconstruct the original audio signal. Rather, each sub-band signal in each of the input channels is applied to a respective sub-band combination circuit such that each respective sub-band combination circuit only combines sub-band signals of the same respective frequency sub-band. The outputs from

these sub-band combination circuits are then applied to the synthesis filters for forming the output channels.

Applicants submit that Smyth et al. neither shows nor suggests "each sub-band combination circuit being supplied with audio signals through respective input channels which lie in one and the same sub-band frequency domain, while the output signals of a sub-band combination circuit covering an associated frequency sub-domain are supplied to one of said synthesis filters for each output channel of said multi-channel audio signal processing device." This is clearly shown in Fig. 2, in which each input channel CH_n is shown supplying a plurality of sub-band audio signals, wherein the "top" sub-band signal in each input channel is applied to the sub-band combination circuit SBS₁, the "second" sub-band signal in each input channel is applied to the sub-band combination circuit SBS₂, etc. The outputs from these sub-band combination circuits are applied, through respective equalization filters H₁, H₂, ..., to the synthesis filter SFB. In order for Smyth et al. to reconstruct the PCM signal as applied to the encoder, any sub-band combination circuit of Smyth et al. would combine all the sub-band signals in a single channel, not intermix the sub-band signals from the various channels as is done in the present invention.

In view of the above, Applicants believe that the subject invention, as claimed, is not rendered obvious by the prior art,

either individually or collectively, and as such, is patentable thereover.

Applicant believes that this application, containing claims 1-8, is now in condition for allowance and such action is respectfully requested.

Respectfully submitted,

by 

Edward W. Goodman, Reg. 28,613
Attorney

Tel.: 914-333-9611

CERTIFICATE OF MAILING

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ANNOTATED SHEET SHOWING CHANGES

1/4

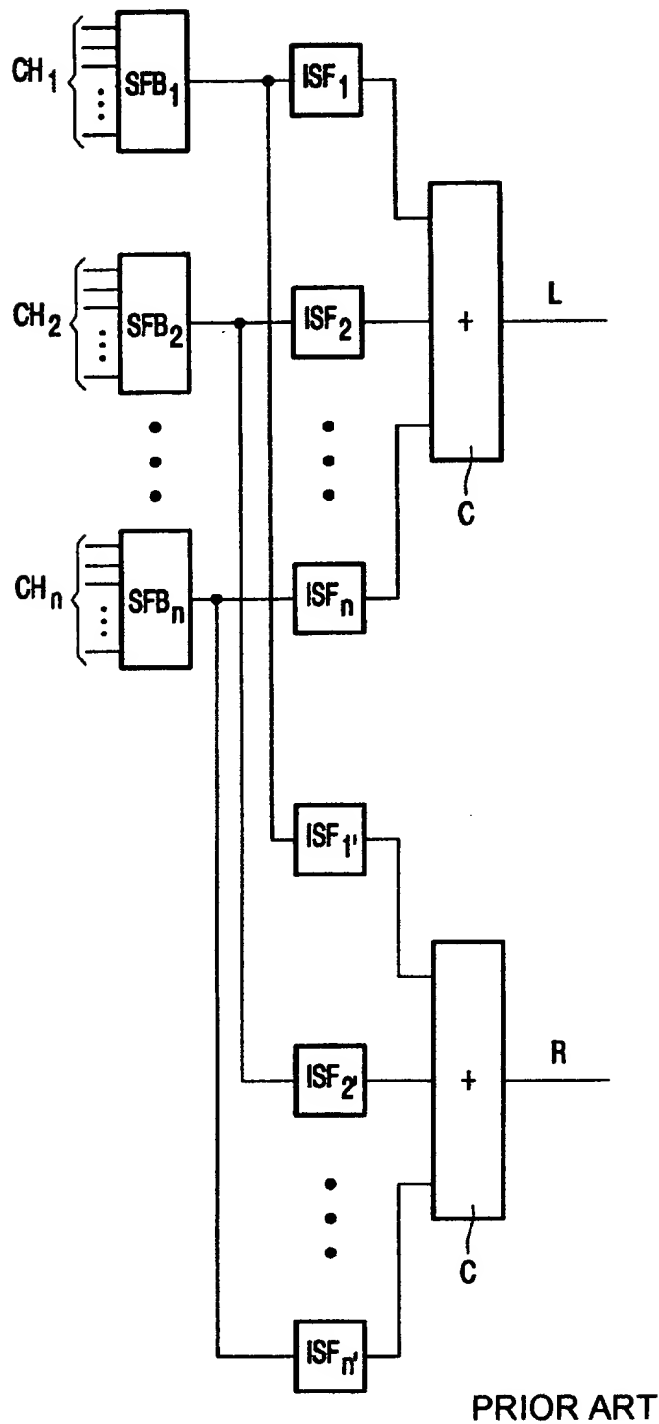


FIG. 1